Quadrature Mixture LO suppression via DSW DAC Noise Dither

ABSTRACT

A Quadrature Error Corrected Digital Waveform Synthesizer (QECDWS) employs frequency dependent phase error corrections to, in effect, pre-distort the phase characteristic of the chirp to compensate for the frequency dependent phase nonlinearity of the RF and microwave subsystem. In addition, the QECDWS can employ frequency dependent correction vectors to the quadrature amplitude and phase of the synthesized output. The quadrature corrections cancel the radars' quadrature upconverter (mixer) errors to null the unwanted spectral image. A result is the direct generation of an RF waveform, which has a theoretical chirp bandwidth equal to the QECDWS clock frequency (1 to 1.2 GHz) with the high Spurious Free Dynamic Range (SFDR) necessary for high dynamic range radar systems such as SAR. To correct for the problematic upconverter local oscillator (LO) leakage, precision DC offsets can be applied over the chirped pulse using a pseudo-random noise dither. The present dither technique can effectively produce a quadrature DC bias which has the precision required to adequately suppress the LO leakage. A calibration technique can be employed to calculate both the quadrature correction vectors and the LO-nulling DC offsets using the radar built-in test capability.